

QUANTUM DOTS FOR ENGINEERABLE  
OPTICAL MODULATOR TRANSFER CHARACTERISTICS

ABSTRACT OF THE DISCLOSURE

A Mach-Zehnder modulator that employs quantum dots to provide a push-pull drive operation. The Mach-Zehnder modulator includes a first arm having a first PIN semiconductor device and a second arm having a second PIN semiconductor device, where the intrinsic layers of the PIN devices include a quantum dot structure. A first DC bias signal is applied to one of the PIN devices, and a second DC bias signal is applied to the other PIN device. The first DC bias signal biases the intrinsic layer at an operating voltage where the index of refraction of the intrinsic layer is at a positive portion of an electro-refraction transfer function, and the second DC bias potential biases the intrinsic layer at an operating voltage where the index of refraction of the intrinsic layer is at a negative portion of the transfer function.